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Indian Standard

IS 3674 : 2020

वस्त्रादि — कपास के रेशे — माइक्रोनेअर माप ज्ञात करना

(पहला पुनरीक्षण)

Textiles — Cotton Fibres — Determination of Micronaire Value

(First Revision)

ICS 59.060.10

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

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Physical Methods of Tests Sectional Committee, TXD 01

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Physical Methods of Tests Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1966. This revision is based on the advancement in technology and the prevalent practice followed in the Indian textile industry. In the present revision, the following major changes have been made:

a) Accuracy of the specimen weight has been modified in line with the corresponding ISO standard.

b) Additional method of test by rapid instrument testing machine like HVI tester has been included.

c) Source of calibration cotton to be used has been modified. Accordingly, use of ICAR-Central Institute for Research on Cotton Technology (ICAR-CIRCOT) calibration cotton and its quality parameters have been specified.

Fineness is one of the important characteristics of cotton fibre. The determination of fineness of cotton fibre by the gravimetric method as prescribed in IS 234 : 2013 ‘Textiles — Method for determination of linear density of textile fibres (gravimetric and vibroscope method) — Specification (*second revision*)’ is time consuming. Therefore, several instruments using airflow method have been designed to determine the fineness values of cotton fibre indirectly.

The airflow instruments, generally prescribed for this method, operate on the principle that the rate of airflow, through a plug of cotton fibre of fixed weight contained in a container of definite dimensions and subjected to a constant pressure head is related to the fineness of the cotton fibre.

Much work has been done by ICAR-CIRCOT to develop and make available a range of cottons for the calibration of airflow instruments. By use of these calibration cottons and application of the procedures prescribed in this standard, it is possible to achieve agreement between two laboratories within ± 0.2 micronaire units in the fineness measurement of the usual commercial sample of cotton.

In formulation of this standard considerable assistance has been derived from ISO 2403 : 2014 ‘Textiles — Cotton fibres — Determination of micronaire value’.

The composition of the Committee responsible for the formulation of this standard is given in Annex G.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

TEXTILES — COTTON FIBRES — DETERMINATION OF MICRONAIRE VALUE

(First Revision)

1 SCOPE

This standard prescribes a method for the determination of micronaire value of loose disorientated cotton fibres by means of airflow instruments. This standard is applicable to cotton taken from bales, laps, slivers or other sources of lint cotton.

2 REFERENCES

The following standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

IS No.	*Title*
4952 : 1968	Methods for sampling of cotton — Bales, slivers and rovings
6359 : 1971	Method for conditioning of textiles

3 TERMINOLOGY

For the purpose of this standard, the following definition shall apply.

3.1 Micronaire Value — A measure of the air permeability of a mass of cotton fibres under specified conditions expressed in terms of an arbitrary scale, called micronaire scale. The micronaire scale is based on a range of cottons to which micronaire values have been assigned by international agreement.

4 PRINCIPLE

Air, under a specified pressure, is passed through a specimen of cotton of known weight confined to a space of known volume. The mass and volume of the specimen may be either constant or varied in relation to each other according to the type of instrument used. The resistance of the specimen to the flow of air is related to the average fineness of the fibres in the specimen. The rate of flow of air through the specimen, or the pressure difference across the specimen (according to the instrument used), is indicated on a scale graduated in either arbitrary units of micronaire value or appropriate absolute units.

5 SAMPLING

5.1 Gross Sample

Take samples at random from different portions of the bulk sample to make up a gross sampleweighing from 250 to 1 000 g.

NOTE — If the bulk sample weighs less than 250 g, the whole of it shall constitute the gross sample.

5.2 Test Sample

Spread the gross sample evenly on a level surface in the form of about 1 × 1 m square. Over this, place a metallic frame work of 1 × 1 m (inside dimensions) divided into 25 equal sub-squares. From each of these sub-squares, pull out at random approximately equal bunches of fibres so as to get a sample weighing about 100 g. This shall constitute the test sample (*see* IS 4952).

5.3 Sampling for Cotton Bales for Rapid Instrument Testing Machine (HVI Tester)

For sampling of the bales for rapid instrument testing machine (HVI tester), the sampling procedure given in **F-1** shall be followed.

6 ATMOSPHERE FOR CONDITIONING AND TESTING

6.1 The test sample shall be conditioned in standard atmosphere at 65 ± 5 percent relative humidity and 27 ± 2 °C temperature for 4 h in moving air (or alternatively for 12 h in still air) or for a shorter time if the change in mass in a 2 h period does not exceed 0.25 percent before weighing and testing of the specimen (*see* IS 6359). Preconditioning is not required.

6.2 Weigh and test the specimen in the standard atmosphere at 27 ± 2 ºC temperature and 65 ± 5 percent relative humidity.

7 APPARATUS

7.1 Balance

The balance shall be of sufficient capacity to weigh the specimen required for the airflow instrument used and capable of weighing thespecimen to an accuracy of 10 mg.

7.2 Airflow Instrument

It shall consist of the following principal parts:

a) Compression cylinder with perforated ends for the admission and discharge of air. The cylinder may be either of a known fixed volume or of variable volume but adjustable to known volume, and in either case, it shall have such dimensions that, with the prescribed weight of the specimen, each cubic centimetre of cylinder shall contain between 0.16 to 0.30 g of cotton when compressed.

b) An air pump or other means for producing the required air pressure applied to the specimen, or the required pressure difference across the specimen.

c) One or more valves or other means for regulating and controlling the flow of air through, or the air pressure difference across the specimen.

d) A gauge or other means for measuring the resistance of the specimen to the airflow, or of the air pressure difference across the specimen. For example, a combination of a manometer for maintaining the air pressure applied to the specimen and a flowmeter for indicating the rate of airflow through the specimen may be used.

7.3 ICAR-CIRCOT Calibration Cotton Standards (*see* Annex A).

8 PREPARATION OF TEST SPECIMENS

8.1 Open the test sample with the fingers, breaking up lumps if any, and eliminating as much of the extraneous matter as possible. Condition the test sample as prescribed in **6.1**.

NOTE — If required by the buyer the opening of the test sample may be done by machine opening.

8.2 Spread the opened, cleaned, and conditioned test sample and divide it into 25 approximately equal groups. Extract small bunches of loose fibres from each group. Remove the pieces of non-fibrous material from fibres so collected and weigh at least two test specimens as specified in **8.3**.

8.3 The test specimens shall be of the size prescribed for the instrument being used. In instruments having compression cylinders of fixed volume, the weight of the specimen shall be within ± 0.2 percent of specimen weight appropriate for the instrument. In instruments having compression cylinders with adjustably varied volume, the weight of the test specimen used shall be known with an accuracy of ± 0.2 percent.

9 PROCEDURE

9.1 Make the necessary preliminary adjustments appropriate to the instrument used (*see* Annex B, C, D, E and F). Calibrate (*see* Annex A) the instrument by testing at least three specimens from at least three calibration cottons.

9.2 The instrument shall be considered to be in calibration, if it reads the calibration cottons within ± 0.1 micronaire value of the established values for the corresponding calibration cotton. If the instrument does not read within these limits, either (a) re-adjust the instruments and repeat the calibration procedure, or (b) use an appropriate correction factor based on the ratio established during the calibration of the instrument.

9.3 Place the test specimen in the fibre compression cylinder, a small portion at a time, taking care that all the fibres are placed inside. Insert the compression plunger in position in the fibre compression cylinder and lock it. Cause the air to flow through the specimen and read the airflow or the difference in pressure on the scale to an accuracy of half a division of the scale.

9.4 Remove the test specimen from the fibre compression cylinder. Open out the specimen and re-pack it into the fibre compression cylinder, taking care that all the fibres are placed inside. Determine one more test value of the specimen in the manner prescribed in **9.3**.

9.5 Take the other test specimen and determine the test values in the manner set out in **9.1** to **9.4**.

NOTE — If the deviation of any individual reading is more than 0.2 from the mean value, prepare two more test specimens as prescribed in **8** and find out the test values by the procedure prescribed in **9.1** to **9.5**.

10 CALCULATION AND EXPRESSION OF RESULTS

10.1 In instruments in which the scale is graduated in micronaire units, find the average of the test values to the nearest 0.1 micronaire unit and report it as the micronaire value of the cotton fibre in the lot.

10.2 For instruments in which the scale is graduated in units other than micronaire, convert the direct reading to micronaire units either from a previously prepared graph or by previously fitted curve (*see* **A-3.1**). Find the average of the values thus obtained to the nearest 0.1 micronaire unit and report it as the micronaire value of the cotton fibre in the lot.

NOTE — Aconversion curve or a conversion equation shall have to be prepared for all instruments not having a micronaire scale in order to make full use of the calibration cottons referred to in Annex A.

11 REPORT

The test report shall include the following:

a) the average value calculated as the micronaire value of the lot;

b) the type, make and model of instrument used; and

c) the average value calculated from minimum fourspecimen readings as the micronaire value of the lot.

ANNEX A

(*Clauses* 7.3, 9.1, *Note under* 10.2, B-3.1, C-2.1, D-2.1 *and* E-2.1)

METHOD OF CALIBRATING AIRFLOW INSTRUMENTS

A-1 CALIBRATION COTTONS

A-1.1 Calibration of airflow instruments is based on samples of a series of ICAR-CIRCOT calibration cottons (*see* Note). Quality characteristics of ICAR-CIRCOT calibration cottons are given in Table 1.

Table 1 Quality Characteristics of ICAR-CIRCOT Calibration Cottons

(*Clause* A-1.1)

Sl No. (1)	Code (2)	Micronaire Value (3)
i)	S-4	4.8
ii)	L-3	3.6
iii)	EL-3	2.8
iv)	Tolerance	± 0.10

NOTE — ICAR-CIRCOT calibration cottons are available from the ICAR-Central Institute for Research on Cotton Technology, 5, Adenwala Road, Grant Road West, Matunga, Mumbai, Maharashtra 400019, e-mail : circotcalibcot@rediffmail.com.

A-1.2 For calibration purposes use the full range of calibration cottons available. They approximately cover the range of micronaire values of the world's commercial cottons.

NOTE — The routine checking and adjusting of the instrument in relation to a section of the instrument's scale is to be distinguished from the more elaborate determination of the locations of numerous points along the full-scale range of the instrument when it is being calibrated. Routine checking for daily use is described in **9.1** and **9.2**. Calibration of an instrument, such as at the factory or upon receiving it at the laboratory or occasionally under other special circumstances at the laboratory, is described in the following subclauses of this Annex.

A-1.3 For each calibration cotton, make a minimum of two test determinations on each of three test specimens. The difference between the test values for the first and second determinations shall not exceed 0.10 unit. If a greater difference is obtained, discard the result and make two determinations on a fresh test specimen. Take the average of the first readings on each of the three test specimens for each calibration cotton.

NOTE — The scale from which the readings are noted can already be graduated in micronaire values (as with most commercially available instruments). For a new instrument, it can be a uniformly graduated scale.

A-2 CALIBRATION OF INSTRUMENTS WITH SCALE GRADUATED IN MICRONAIRE UNITS

For instruments already fitted with a scale graduated in micronaire values, determine the difference between the average scale reading and the corresponding established value for each cotton. If none of these differences exceeds 0.10 unit, regard the previous calibration of the instrument as satisfactory. If greater differences occur, make appropriate checks and adjustments to bring the instrument performance into compliance with the above requirements. Alternatively, a series of appropriate scale corrections can be calculated.

A-3 CALIBRATION OF INSTRUMENTS WITH SCALE GRADUATED IN OTHER THAN MICRONAIRE UNITS

A-3.1 For instruments fitted with a scale graduated in other than micronaire values, either plot a graph showing the average instrument readings as abscissae and the corresponding established values as ordinates and draw a smooth curve to pass evenly through the points or determine statistically the relation between average instrument readings and corresponding established values in the form of an equation. The deviations between average scale readings and established micronaire value shall not be greater than the equivalent of 0.10 units, as indicated by the graph or by the statistically established relation, as in **A-2.1**.

A-3.2 Use the calibration curve, or the corresponding statistically relation, to convert final test values yielded by cotton samples into micronaire values. Alternatively, fit the instrument with a scale graduated in micronaire values, the marking of which are obtained from the calibration curve or from the statistical relation.

ANNEX B

(*Clause* 9.1)

OPERATION OF THE MICRONAIRE AIRFLOW INSTRUMENTS*

B-0 GENERAL

There are several models of the micronaire instrument which vary only in details of construction and operation intended to increase safety, ease and speed of operation. For any other operational or constructional details not given here, the manufacturer’s instructions supplied with the instrument shall be consulted

B-1 MICRONAIRE MODEL I

B-1.1 Adjust and calibrate the instrument mechanically as follows.

B-1.1.1 Set the primary air regulator to give a pressure of 1.76 kg/cm^2 (172 kPa) and open the shut-off valve that admits air to the instrument. Check the reading after the air flows through the instrument and make a re-adjustment if necessary.

B-1.1.2 Insert the manometer plug in the compression cylinder, allow the air to enter and adjust the secondary air regulator so as to obtain a pressure of 0.42 kg/cm^2 (41.4 kPa) in compression cylinder. Again, if necessary, after the air flows through the instrument, re-adjust the regulating valve.

B-1.1.3 Insert one of the master orifice plugs, allow the air to enter, and if necessary, turn the calibration screw to bring the float to the position on the curvilinear scale corresponding to the designation of the orifice plug. Repeat these operations, using the other orifice plug or disc.

NOTES

1 Instead of two calibration discs, each with its bore one disc with two different bores may be used. If the latter is used, close one of the bores with a finger at the lower scale value of 2.81, the bore to be closed being especially marked.

2 The scale readings 2.8 and 6.2 respectively correspond to flow rates of 21.1 ± 0.8 litre/min and 49.3 ± 1.4 litre/min.

B-2 MICRONAIRE MODEL II

B-2.1 Adjust and calibrate the instrument mechanically as follows.

B-2.1.1 Operate the foot valve and see that the air pressure behind the filter is between 4.22 kg/cm^2 (413 kPa) and 8.79 kg/cm^2 (862 kPa).

B-2.1.2 Open the pressure regulator and the upper and lower adjusting valves, as far as possible.

B-2.1.3 Insert the control disc in the test chamber, open the foot valve. Operate the pressure regulator so that the mercury column rises to 0.31 kg/cm^2 (30.3 kPa). The air shall pass through both bores of the control disc without hindrance. Operatethe valve several times consecutively. The mercury shall always rise to the same height.

B-2.1.4 Adjust the upper edge of the float against micronaire value of 4.6 by regulating the lower adjusting valve.

B-2.1.5 Adjust the upper edge of the float approximately to micronaire value of 6.0 (upper check mark) by regulating the upper adjusting valve.

B-2.1.6 Tightly close the upper opening of the control disc with one finger. The float will then fall to about the level of lower check mark.

B-2.1.7 In order to make an exact adjustment, while alternately opening and closing the upper opening of the control disc, alternately change the lower and upper adjusting valves. Do this until the upper edge of the float corresponds with the two check marks located at about micronaire values of 2.9 and 6.0.

B-2.1.8 Turn the pressure regulator until the mercury column stands at 0.33 kg/cm^2 (32.4 kPa).

B-2.1.9 By opening and closing the upper opening of the control disc, check whether the upper and lower positions of the float still correspond with the two adjustment marks even after the change of the mercury column from 0.31 kg/cm^2 (30.3 kPa) to 0.33 kg/cm^2 (32.4 kPa). If this does not occur, repeat the procedure as given in **B-2.1.7**.

B-2.1.10 Open and close the upper opening of the control disc several times. If the adjustments were correctly made, the float position shall correspond to both marks without further changes of the adjusting valves.

NOTE — If manufacturer’s instruction are different from those given above, adhere to the principles of these (standard) instructions as closely as possible.

B-3 CALIBRATION AND TESTING

B-3.1 After adjusting the instrument mechanically **(B-1.1.1** to **B-1.1.3** or **B-2.1.1** to **B-2.1.10,** depending upon the instrument used), check theinstrument with at least three ICAR-CIRCOT calibration cottons (*see* Annex A). Repeat the check with the calibration cottons at frequentintervals.

B-3.2 Follow the instructions given in **5**, **6** and **8** for sampling, conditioning of samples and preparation of specimens to be tested.

NOTE — The test specimen shall weigh 3.24 g ± 0.2 percent.

B-3.3 Follow the instructions given in **9.1** to **9.5** for loading the specimen, closing the compression cylinder, and reading the gauge.

B-3.4 Follow the instructions given in **10** and **11** for calculating and reporting the test result.

*Mention of the name of a specific (or proprietary) instrument is not intended to promote or give preference to the use of that instrument.

ANNEX C

(*Clause* 9.1)

OPERATION OF THE W.I.R.A. FINENESS METER (COTTON MODEL)*

C-0 GENERAL

There are three models of the W.I.R.A. Fineness meter (cotton model) described as the 'old model', '2nd' and 'new model' respectively. They differ primarily in the scale units and size of test specimen used. The old model is graduated in litres per minute and measures a specimen weighing 6.0 g. The 2nd model is equipped with a scale graduated in micronaire units and measures a specimen weighing 2.5 g and the new model measure a specimen weighing 4 g. For any other constructional or operational details not given here, the manufacturer's instructions supplied with the instrument shall be consulted.

NOTE — The test specimen for the old model W.I.R.A. shall weigh 6.0 g ± 0.5 percent; and for the 2nd model, it shall weigh 2.5 g ± 0.2 percent; and for the new model, it shall weigh 4 g ± 0.3 percent.

C-1 ADJUSTMENT OF THE INSTRUMENT

For preliminary calibration, adjust the instrument until the level of the liquid in the manometer tube coincides with the upper 'zero' mark.

NOTE — The lower edge of the meniscus is observed when noting the length of the liquid column.

C-2 CALIBRATION AND TESTING

C-2.1 After preliminary adjustment, calibrate the instrument by using at least three ICAR-CIRCOT calibration cottons (*see* Annex A).

C-2.2 Follow instructions given in **5**, **6** and **8** for sampling, conditioning of samples and preparation of specimens to be tested.

C-2.3 Follow instructions given in **9.1** to **9.5** for loading the specimen, closing the compression cylinder, and reading the gauge.

C-2.4 Follow instructions given in **10** and **11** for calculating and reporting results.

*Mention of the name of a specific (orproprietary) instrument is not intended to promote or give preference to the use of thatinstrument.

ANNEX D

(*Clause* 9.1)

OPERATION OF THE ATIRA FIBRE FINENESS TESTER*

D-0 GENERAL

Theinstrument developed by the Ahmedabad Textile Industry's Research Association (ATIRA) measures the 'Micronaire value' Mc and 'Maturity fineness' MH of cottons on two separate scales. Cotton having Mc values in the range of 2.5 to 6.5 or MH values from l.5 to 7.0 may be tested on this instrument. Mc value is the micronaire value and MH value is the product of the maturity ratio and the fineness in micrograms per inch as obtained by weighing whole fibres. For any other constructional or operational details not given here, the manufacturer's instructions supplied with the instrument shall be consulted.

D-1 ADJUSTMENT OF THE INSTRUMENT

D-1.1 Level the instrument accurately with the levelling screws provided.

D-1.2 Check the level of the liquid in the manometer. The level shall coincide with the reference mark on the initial vertical portion of the manometric scale. If the level is lower, open the reservoir and top up with the provided manometric liquid.

D-1.3 Squeeze the aspirator bulb, so that the float in the air tank rises to the top. As the float descends, gently close the fibre compression cylinder with the rubber stopper. See that the level of the manometer liquid stays between the limits marked on the final vertical section of the scale.

D-2 CALIBRATION AND TESTING

D-2.1 After preliminary adjustment calibrate the instrument by using the ICAR-CIRCOT calibration cottons (*see* Annex A).

D-2.2 Follow the instructions given in **5**, **6** and **8** for sampling, conditioning of samples and preparation of specimens to be tested.

NOTE — The test specimen shall weigh 5.0 g ± 0.2 percent.

D-2.3 Follow the instructions given in **9.1** to **9.5** for loading the specimen, closing the compression cylinder and reading the gauge.

D-2.4 Follow the instructions given in **10** and **11** for calculating and reporting the test result.

*The ATIRA Fibre Fineness Tester is available at Ahmedabad Textile Industry's Research Association, Navrangpura, Ahmedabad-9. Mention of the name of a specific (or proprietory) instrument is not intended to promote or give preference to the use of that instrument.

ANNEX E

(*Clause* 9.1)

OPERATION OF PORT-AR FIBRE FINENESS TESTER*

E-0 GENERAL

It is a portable Arealometer meant for use at places where the cotton is traded or processed. It is graduated in 'equivalent fibrethickness' in microns and micronaire units. The two scales are graduated from 3 to 7 microns and 2.5 to 7 micronaire units respectively. It measures a specimen of 8.0 g. It can be read to an accuracy of ± 0.05 micronaire unit. For any other constructional or operational details, not given here, the manufacturer's instructions supplied with the instrument shall be consulted.

E-1 ADJUSTMENT OF THE INSTRUMENT

E-1.1 Place the instrument on a level surface and remove the cover. Check the zero of the permeability indicating meter.

E-1.2 Place a weight of 8 g on the weighing scale and with the compression lever in the top position, adjust the zero screw until the permeability indicating meter reads near the red mark on the scale.

E-1.3 Take approximately 8.0 g of cotton and place on the weighing scale. Give one stroke to the pump of the atomizer bulb and see whether the specimen is heavier or lighter than 8.0 g. If the indicator goes above the red mark, the specimen is heavier and if it goes below, the specimen is lighter. By taking off or adding bit by bit, adjust the specimen weight to 8.0 g.

E-2 CALIBRATION AND TESTING

E-2.1 After preliminary adjustment calibrate the instrument by using the ICAR-CIRCOT calibration cottons (*see* Annex A).

E-2.2 Follow the instructions given in **5, 6** and **8** for sampling, conditioning of samples and preparation of specimens (respectively) to be tested.

NOTE — The test specimen shall weigh 8.0 ± 0.2 percent.

E-2.3 Follow the instructions given in **9.1** to **9.5** for loading the specimen, closing the compression cylinder and reading the gauge.

E-2.4 Follow the instructions given in **10** and **11** for calculating and reporting the test result.

ANNEX F

(*Clause* 9.1)

OPERATION OF RAPID INSTRUMENT TESTING MACHINE (HVI TESTER)*

F-1 SAMPLING FOR COTTON BALES

Take one specimen from the bale sample. One specimen from each bale shall consist of two portions, one portion from each side of the bale. Take the specimen from the space between the wires or ties in such a way that each portion shall be 305 mm long and 154 mm wide. Weight of each portion shall be 114 g approximately so as to give a total specimen weight of 228 g approximately.

NOTE — For sampling from laps, slivers or other source of lint cotton, sampling specified in **5.1** and **5.2** shall be followed.

F-2 CALIBRATION AND TESTING

F-2.1 Open the test sample with the fingers, breaking up lumps if any, and eliminating as much of the extraneous matter as possible. Condition the test sample as prescribed in **6.1**.

NOTE — If required by the buyer the opening of the test sample may be done by machine opening.

F-2.2 Weight the specimen as per the equipment manufacture's instruction and place the specimen into the instrument's micronaire measurement area for testing.

F-2.3 Follow instructions given in **9.1** to **9.5** for loading the specimen, closing the compression cylinder, and reading the gauge.

F-2.4 Follow instructions given in **10** and **11** for calculating and reporting results.

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*Mention of the name of a specific (or proprietary) instrument is not intended to promote or give preference to the use of that instrument.

ANNEX G

(*Foreword*)

COMMITTEE COMPOSITIONx

Physical Methods of Test Sectional Committee,TXD 01

Organization	*Representative(s)*
ICAR – Central Institute for Research on Cotton Technology, Mumbai	Dr P. G. Patil (***Chairman***)
Bidhata Industries Pvt Ltd, Mumbai	Shri R. K. Pacheriwala Shri Rohit Pacheriwala (*Alternate*)
Central Silk Technological Research Institute, Bangaluru	Dr Subhas V. Naik Dr Prakash Bhat (*Alternate*)
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Texanlab Laboratories Pvt Ltd, Navi Mumbai	Shriharit Sardana Ms Yojana Gawas (*Alternate*)
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Thanawala & Co, Mumbai	Shri Hemal Thanawala Shri Upendera Thanawala (*Alternate*)
The Arvind Mills Limited, Ahmedabad	Shri Narendra Kajale Shrimati Mamta Chaudhary (*Alternate*)

Organization	*Representative(s)*
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World Traders Manufacturing Co, Mumbai	Shri Varun Gupta Shri Aditya Gupta (*Alternate*)
In personal capacity (*B-21, Parijat, Talepakhadi, Eskar Road, Borivali, Mumbai-400091*)	Dr R. P. Nachane
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Member Secretary

Shri J. K. Gupta
Scientist 'D' (TXD), BIS

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Amendments Issued Since Publication

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Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
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Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002
2323 7617
2323 3841

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KOLKATA 700054
2337 8499, 2337 8561
2337 8626, 2337 9120

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg
CHANDIGARH 160019
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265 0290

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113
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